IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicants: Jill MacDonald Boyce

Examiner: Ahmed, E.

Serial No: 10/511,638

Group Art Unit: 2112

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Docket: PU020126

For: SYNCHRONIZATION LOSS RESILIENT DIGITAL COMMUNICATION SYSTEM USING FORWARD ERASURE CORRECTION

Mail Stop Appeal Brief-Patents
Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Applicants appeal the status of Claims 1-3, 5-9, 11-14, and 16-20 as rejected in the non-final Office Action dated December 7, 2007 and the final Office Action dated July 31, 2008, pursuant to the Notice of Appeal dated February 18, 2009 and submit this appeal brief.

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1. Real Party in Interest

The real party in interest is THOMSON LICENSING S.A., the assignee of the entire right title and interest in and to the subject application by virtue of an assignment recorded with the Patent Office on **[TBD]** at reel/frame **[TBD]**.

2. Related Appeals and Interferences

None

3. Status of Claims

Claims 1-3, 5-9, 11-14, and 16-20 are pending. Claims 1-3, 5-9, 11-14, and 16-20 stand rejected and are under appeal.

A copy of the Claims 1-3, 5-9, 11-14, and 16-20 is presented in Section 8 below.

4. Status of Amendments

A Preliminary Amendment, filed with the PTO on October 18, 2004, was entered. An Amendment under 37 CFR §1.111, filed with the PTO on May 20, 2008 in response to a non-final Office Action dated December 7, 2007, was entered. No Responses/Amendments were filed subsequent to the above Amendment filed on May 20, 2008. A final Office Action dated July 31, 2008, to which this Appeal Brief is directed, is currently pending.

5. **Summary of Claimed Subject Matter**

Independent Claim 1 is directed to "[a]n apparatus for enabling recovery of missing information in a digital communication system" (Claim 1, preamble).

The subject matter of the first element (beginning with "a Forward Erasure Correction (FXC) encoder") recited in Claim 1 is described, e.g., at: page 4, line 20 to page 5, line 3; page 9, lines 1-5; and page 10, lines 6-9. Moreover, the subject matter of the first element of Claim 1 involves, e.g.: element 110 of FIG. 1.

The subject matter of the second element (beginning with "a multiplexer") recited in Claim 1 is described, e.g., at: page 9, lines 1-5; and page 10, lines 9-13. Moreover, the subject matter of the second element of Claim 1 involves, e.g.: element 115 of FIG. 1.

Independent Claim 9 is directed to "[a]n apparatus for recovering missing information in a digital communication system" (Claim 9, preamble).

The subject matter of the first element (beginning with "a Forward Erasure Correction (FXC) decoder") recited in Claim 9 is described, e.g., at: page 4, line 20 to page 5, line 3; page 11, lines 10-14; page 12, lines 22-23; and page 13, lines 1-14. Moreover, the subject matter of the first element of Claim 9 involves, e.g.: element 255 of FIG. 2.

The subject matter of the second element (beginning with "wherein") recited in Claim 9 is described, e.g., at: page 11, lines 10-14; page 12, lines 22-23; and page 13, lines 1-6. Moreover, the subject matter of the second element of Claim 9 involves, e.g.: element 255 of FIG. 2.

Independent Claim 12 is directed to "[a] method for enabling recovery of missing information in a digital communication system" (Claim 12, preamble).

The subject matter of the first element (beginning with "computing") recited in Claim 12 is described, e.g., at: page 4, line 20 to page 5, line 3; page 9, lines 1-5; and page 10, lines 6-9. Moreover, the subject matter of the first element of Claim 12 involves, e.g.: element 110 of FIG. 1.

The subject matter of the second element (beginning with "multiplexing") recited in Claim 12 is described, e.g., at: page 9, lines 1-5; and page 10, lines 9-13. Moreover, the subject matter of the second element of Claim 12 involves, e.g.: element 115 of FIG. 1.

Independent Claim 20 is directed to "[a] method for recovering missing information in a digital communication system" (Claim 20, preamble).

The subject matter of the first element (beginning with "decoding FXC parity superpackets") recited in Claim 20 is described, e.g., at: page 4, line 20 to page 5, line 3; page 11, lines 10-14; page 12, lines 22-23; and page 13, lines 1-14. Moreover, the subject matter of the first element of Claim 20 involves, e.g.: element 255 of FIG. 2.

The subject matter of the second element (beginning with "decoding FXC sync transport packets") recited in Claim 20 is described, e.g., at: page 11, lines 10-14; page 12, lines 22-23; and page 13, lines 1-6. Moreover, the subject matter of the second element of Claim 20 involves, e.g.: element 255 of FIG. 2.

6. Grounds of Rejection to be Reviewed on Appeal

Claims 1, 3, 5-9, 11-12, 14, and 16-20 stand rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,421,387 to Rhee (hereinafter "Rhee"). Claims 2 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Rhee in view of U.S. Patent No. 6,145,109 to Schuster et al. (hereinafter "Schuster").

The preceding rejections under 35 U.S.C. §102(e) and 35 U.S.C. §103(a) are presented for review in this Appeal with respect to Claims 1-3, 5-9, 11-14, and 16-20, as argued with respect to independent Claims 1, 9, 12, and 20.

Regarding the grouping of the claims with respect to the rejection under 35 U.S.C. §102(e), Claims 3, 5-8, stand or fall with Claim 1, Claim 11 stands or falls with Claim 9, Claims 14 and 16-19 stand or fall with Claim 12, and Claim 20 stands or falls by itself, due to their respective dependencies.

Regarding the grouping of the claims with respect to the rejection under 35 U.S.C. §103(a), Claim 2 stands alone (as argued with respect to the limitations of Claim 1 from which it depends), and Claim 13 stands alone (as argued with respect to the limitations of Claim 12 from which it depends).

7. Argument

A. Introduction

In general, the present invention is directed to synchronization loss resilient digital communication system using forward erasure correction (Applicant's Specification, Title). As disclosed in the Applicant's specification at page 1, lines 13-17:

> Wireless digital communications systems are subject to multi-path and fades, which can lead to loss of synchronization. The data transmitted during periods of lost synchronization are normally lost to the receiver. Thus, the problem to be solved is how to design a wireless digital communication system that is resilient to synchronization loss due to multi-path and fading, with as low an overhead rate as possible.

The claims of the pending invention include novel features not shown in the cited references and that have already been pointed out to the Examiner. These features provide advantages over the prior art and dispense with prior art problems such as those described above with reference to the Applicant's specification.

It is respectfully asserted that independent Claims 1, 9, 12, and 20 are each patentably distinct and non-obvious over the cited references in their own right. For example, the below-identified limitations of independent Claims 1, 9, 12, and 20 are not shown in any of the cited references, either taken singly or in any combination. Moreover, these Claims are distinct from each other in that they are directed to different implementations and/or include different

limitations. For example, while Claims 1 and 9 are directed to respective apparatus and Claims 12 and 20 are directed to respective methods, each of Claims 1 and 9 include different limitations with respect to each other and each of Claims 12 and 20 include different limitations with respect to each other. Accordingly, each of independent Claims 1, 9, 12, and 20 represent separate features/implementations of the invention that are separately novel and non-obvious with respect to the prior art and to the other claims. As such, independent Claims 1, 9, 12, and 20 are separately patentable and are each presented for review in this appeal.

B. Whether Claims 1, 3, 5-9, 11-12, 14, and 16-20 are Anticipated Under 35 U.S.C. §102(e) With Respect To U.S. Patent No. 6,421,387 to Rhee

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP §2131, citing Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

The Examiner rejected Claims 1, 3, 5-9, 11-12, 14, and 16-20 as being unpatentable over U.S. Patent No. 6,421,387 to Rhee (hereinafter "Rhee"). The Examiner contends that Rhee shows all the limitations recited in Claims 1, 3, 5-9, 11-12, 14, and 16-20.

Rhee is directed to "methods and systems for forward error correction based loss recovery for interactive video transmission" (Rhee, Title). In further detail, Rhee discloses the following in his Abstract:

Real-time interactive video transmission in the current Internet has mediocre quality because of high packet loss rates. Loss of packets belonging to a video frame is evident not only in the reduced quality of that frame but also in the propagation of that distortion to successive frames. This error propagation problem is inherent in any motion-based video codec because of the interdependence of encoded video frames. Since packet losses in the best-effort Internet environment cannot be prevented, minimizing the impact of these packet losses to the final video quality is important. A new forward error correction (FEC) technique effectively alleviates error propagation in the transmission of interactive video. The technique is based on a recently developed error recovery scheme called Recovery from Error Spread using Continuous Updates (RESCU). RESCU allows transport level recovery techniques previously known to be infeasible for interactive video transmission applications to be successfully used in such applications. The FEC technique can be very useful when the feedback channel from the receiver is highly limited, or transmission delay is high. Both simulation and Internet experiments indicate that the FEC technique effectively alleviates the error spread problem and is able to sustain much better video quality than H.261 or other conventional FEC schemes under various packet loss rates.

It will be shown herein below that the limitations of Claims 1, 3, 5-9, 11-12, 14, and 16-20 reproduced herein are not shown in Rhee, and that Claims 1, 3, 5-9, 11-12, 14, and 16-20 should be allowed.

B1. Claims 1, 3, 5-9, 11-12, 14, and 16-20

Initially, it is respectfully pointed out to the Examiner that Claims 3 and 5-8 directly or indirectly depend from independent Claim 1, Claim 11 directly depends from independent Claim 9, and Claims 14 and 16-19 directly or indirectly depend from independent Claim 12. Thus, Claims 3 and 5-8 include all the limitations of Claim 1, Claim 11 includes all the limitations of Claim 9, and Claims 14 and 16-19 include all the limitations of Claim 12.

It is respectfully asserted that that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claims 1, 3 and 5-8 (with the following applicable to Claims 3 and 5-8 by virtue of their respective dependencies from Claim 1):

> a Forward Erasure Correction (FXC) encoder for computing FXC parity superpackets across information superpackets for subsequent recovery of any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss; and
>
> a multiplexer for multiplexing the information super packets and the FXC parity superpackets prior to any transmission thereof.

It is respectfully asserted that that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claims 9 and 11 (with the following applicable to Claim 11 by virtue of its dependency from Claim 9):

a Forward Erasure Correction (FXC) decoder for decoding FXC parity superpackets previously computed across information superpackets to recover any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss;

wherein said FXC decoder further decodes FXC sync transport packets to determine superpacket sequence numbers and superpacket positions for both the FXC parity superpackets and the information superpackets.

It is respectfully asserted that that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claims 12, 14, and 16-19 (with the following applicable to Claims 14 and 16-19 by virtue of their respective dependencies from Claim 12):

computing FXC parity superpackets across information superpackets for subsequent recovery of any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss; and

multiplexing the information superpackets and the FXC parity superpackets prior to any transmission thereof.

It is respectfully asserted that that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claim 20:

decoding FXC parity superpackets previously computed across information superpackets to recover any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss; and

decoding FXC sync transport packets to determine superpacket sequence numbers and superpacket positions for both the FXC parity superpackets and the information superpackets.

The following portions of Rhee were cited against the above recited limitations: col. 4, lines 29-42; col. 4, line 50 - col. 5, line 10; col. 5, lines 38-55; col. 6, lines 5-18; col. 6, line 63 - col. 7, line 9; col. 7, lines 19-37; and col. 8, line 33 - Col. 9, line 30.

In these sections, Rhee discusses the use of Forward error correction (FEC) codes, and in particular, an example is used for a Reed Solomon Erasure correcting code (RSE) Code in combination with recovery from error spread using continuous updates (RESCU).

However, nowhere in the cited sections, nor in the entire disclosure, does Rhee disclose or suggest a Forward Erasure Correction (FXC) encoder as recited in the above mentioned claims. It is clear from the teachings of Rhee, that no such additional encoder (and corresponding decoder) has been contemplated. In fact, Rhee teaches away from this concept at column 2, lines 45 et seq., where Rhee states:

According to one aspect, the present invention includes a new FEC

technique for interactive video that combines FEC with RESCU. By incorporating this FEC technique, RESCU can perform very effectively in an environment where little or no feedback is available, or transmission delay is too high for retransmission to be effective. The FEC scheme according to the present invention clearly differs from the conventional schemes in that FEC packets can be transmitted over a longer period than a single frame interval without introducing delay in frame playout times. Since RESCU uses FEC packets to restore buffered reference frames (referred to herein as periodic frames), FEC packets can be transmitted over a relatively longer period, interleaving with the packets of other (non-periodic) frames to help reduce the effect of bursty losses.

As stated in Applicant's description of their invention at page 7, lines 7-21, the FXC Coding of the present invention is "**added**" to other channel coding methods that protect against impulse noise. For example, as disclosed in the preceding cited section of the Applicant's specification, the FXC coding of the present invention can be added to the communication system's interleaving and Reed Solomon (RS) Forward error correction (FEC) coding. Applicant further goes on to state "In contrast, existing RS FEC protects against random bit or byte errors, not erasures, inside a given packet, with the samples taken from nearby points in time." Hence, the bit/byte error correcting Reed Solomon codes disclosed in Rhee (see, e.g., Rhee, col. 1, lines 25-28) are different from, and do not correspond to, the forward erasure correction (FXC) parity superpackets or FXC sync transport packets recited in Claims 1, 9, 12, and 20.

With respect to Claims 1 and 12, and contrary to the Examiner's assertion, Rhee fails to

disclose or suggest the concept of multiplexing the information superpackets and the FXC parity super packets "prior to" transmission. In fact, at column 7, lines 10-19, Rhee states the following (emphasis added):

> In combining RESCU with FEC, **the original data** of a periodic frame **is** packetized into k source packets and **transmitted** **over the frame interval of the periodic frame**. A frame interval refers to the time to transmit all of the data packets of a periodic frame. ***AFTER the frame interval for the periodic frame***, n-k **parity packets for the periodic frame** **are transmitted** over the PTDD period. The *transmission time* of each parity packet *is evenly spaced* over the period, *interleaving with the packets of other frames*.

From this passage, it is clear that Rhee does not contemplate the idea of multiplexing the information superpackets with the parity superpackets *before or prior* to the actual transmission, and in fact, actually teaches away from the claimed invention. In view of this aspect of the claimed invention, Rhee neither anticipates, nor renders obvious the present invention.

The Examiner has stated the following on page 3 of the pending final Office Action:

> [T]he Rhee reference teaches combining FEC or superpackets with RESCU or FXC super packets. Further, the Rhee reference states RESCU uses FEC packets to restore buffered frames, and the FEC packets then can be transmitted over a relatively large period. Thus, the Rhee reference teaches the

concept of multiplexing the information superpackets and the FXC parity super packets "prior to" transmission (column 2, line 45 - column 3, line 10).

However, **it is respectfully pointed out that none of the words "super" or "superpacket" or "FXC" occur even once in the entire disclosure of Rhee**.

With respect to Claims 9 and 20, these claims include the concept of the FXC sync transport packets recited in the present application. A review of Rhee does not disclose or suggest the use of FXC sync transport packets as claimed herein. In fact, there is no mention whatsoever of sync transport packets used by the system of Rhee. The cited portions of Rhee (i.e., Col 5, lines 38-55 and Col. 6, line 63 - Col. 7, line 9) do not disclose, nor remotely suggest the concept of using sync transport packets at all.

The Examiner has stated the following on page 3 of the pending final Office Action:

> [T]he Rhee reference discloses transport level recovery techniques in addition to synchronization points being used for the packets. Thus, the Rhee reference teaches the use of FXC sync transport packets (column 4, lines 29-42), (column 4, line 50 - column 5, line 10) and (column 6, lines 5-18).

Initially, it is respectfully asserted that the simple disclosure of transport level recovery techniques in Rhee (see, e.g., Rhee Abstract) does not necessarily teach or suggest the use of FXC sync transport packets. For example, a program clock reference (PCR) is commonly used for synchronization with respect to transport level recovery.

Moreover, column 2, lines 45-47 of Rhee disclose the following: "According to one aspect, the present invention includes a new FEC technique for interactive video that combines FEC with RESCU". Further, the Abstract of Rhee discloses the following: "RESCU allows transport level recovery techniques previously known to be infeasible for interactive video transmission applications to be successfully used in such applications." Hence, given that the transport level recovery techniques are explicitly disclosed in Rhee as corresponding to RESCU (and, hence, not FEC), and the Examiner has equated FXC as claimed in the pending claims with FEC as disclosed by Rhee, the transport level recovery techniques disclosed in Rhee cannot correspond to FXC parity superpackets but rather to some aspect of RESCU.

Hence, Rhee does not teach or suggest the above recited limitations of Claims 1, 3, 5-9, 11-12, 14, and 16-20.

Accordingly, Claims 1, 3, 5-9, 11-12, 14, and 16-20 are patentably distinct and non-obvious over Jun for at least the reasons set forth above. Therefore, withdrawal of the rejection and allowance of Claims 1, 3, 5-9, 11-12, 14, and 16-20 is earnestly requested.

C. Whether Claims 2 and 13 are Unpatentable Under 35 U.S.C. §103(a) With Respect To U.S. Patent No. 6,421,387 to Rhee in view of U.S. Patent No. 6,145,109 to Schuster et al.

"To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art" (MPEP §2143.03, citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). "If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious" (MPEP §2143.03, citing *In re Fine*, 837 F.2d

1071, 5 USPQ2d 1596 (Fed. Cir. 1988)).

The Examiner rejected Claims 2 and 13 as being unpatentable over U.S. Patent No. 6,421,387 to Rhee (hereinafter "Rhee") in view of U.S. Patent No. 6,145,109 to Schuster et al. "hereinafter "Schuster"). The Examiner contends that the cited combination shows all the limitations recited in Claims 2 and 13.

Rhee is directed to "methods and systems for forward error correction based loss recovery for interactive video transmission" (Rhee, Title). In further detail, Rhee discloses the following in his Abstract:

> Real-time interactive video transmission in the current Internet has mediocre quality because of high packet loss rates. Loss of packets belonging to a video frame is evident not only in the reduced quality of that frame but also in the propagation of that distortion to successive frames. This error propagation problem is inherent in any motion-based video codec because of the interdependence of encoded video frames. Since packet losses in the best-effort Internet environment cannot be prevented, minimizing the impact of these packet losses to the final video quality is important. A new forward error correction (FEC) technique effectively alleviates error propagation in the transmission of interactive video. The technique is based on a recently developed error recovery scheme called Recovery from Error Spread using Continuous Updates (RESCU). RESCU allows transport level recovery techniques previously known to be infeasible for interactive video transmission applications to be successfully used

in such applications. The FEC technique can be very useful when the feedback channel from the receiver is highly limited, or transmission delay is high. Both simulation and Internet experiments indicate that the FEC technique effectively alleviates the error spread problem and is able to sustain much better video quality than H.261 or other conventional FEC schemes under various packet loss rates.

Schuster is directed to "MPEG data frame and transmit and receive system using same" (Schuster, Title). In further detail, Schuster discloses the following in his Abstract:

> A computationally simple yet powerful forward error correction code scheme for transmission of real-time media signals, such as digitized voice, video or audio, in a packet switched network such as the Internet. An encoder at the sending end derives p redundancy blocks from each group of a k payload blocks and concatenates the redundancy blocks, respectively, with payload blocks in the next group of k payload blocks. At the receiving end, a decoder may recover up to p missing packets in a group of k packets, provided with the p redundancy blocks carried by the next group of k packets. The invention thereby enables correction from the loss of multiple packets in a row, without significantly increasing the data rate or otherwise delaying transmission.

It will be shown herein below that the limitations of Claims 2 and 13 reproduced herein (as argued with respect to independent Claims 1 and 12 from which they respectively depend) are not shown in the cited combination, and that Claims 2 and 13 should be allowed.

C1. Claims 2 and 13

Initially, it is respectfully pointed out to the Examiner that Claim 2 directly depends from independent Claim 1 and Claim 13 directly depends from independent Claim 12. Thus, Claim 2 includes all the limitations of Claim 1 and Claim 13 includes all the limitations of Claim 12.

It is respectfully asserted that neither Rhee nor Schuster, either taken singly or in combination, teach or suggest the following limitations of Claim 2 (with the following applicable to Claim 2 by virtue of its dependency from Claim 1):

> a Forward Erasure Correction (FXC) encoder for computing FXC parity superpackets across information superpackets for subsequent recovery of any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss; and
>
> a multiplexer for multiplexing the information super packets and the FXC parity superpackets prior to any transmission thereof.

It is respectfully asserted that that none of the cited references, either taken singly or in combination, teach or suggest the following limitations of Claim 13 (with the following applicable to Claim 13 by virtue of its dependency from Claim 12):

computing FXC parity superpackets across information superpackets for subsequent recovery of any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss; and

multiplexing the information superpackets and the FXC parity superpackets prior to any transmission thereof.

The following portions of Rhee were cited against the above recited limitations: col. 4, lines 29-42; col. 4, line 50 - col. 5, line 10; col. 5, lines 38-55; col. 6, lines 5-18; col. 6, line 63 - col. 7, line 9; col. 7, lines 19-37; and col. 8, line 33 - Col. 9, line 30.

In these sections, Rhee discusses the use of Forward error correction (FEC) codes, and in particular, an example is used for a Reed Solomon Erasure correcting code (RSE) Code in combination with recovery from error spread using continuous updates (RESCU).

However, nowhere in the cited sections, nor in the entire disclosure, does Rhee disclose or suggest a Forward Erasure Correction (FXC) encoder as recited in the above mentioned claims. It is clear from the teachings of Rhee, that no such additional encoder (and corresponding decoder) has been contemplated. In fact, Rhee teaches away from this concept at column 2, lines 45 et seq., where Rhee states:

According to one aspect, the present invention includes a new FEC technique for interactive video that combines FEC with RESCU. By incorporating this FEC technique, RESCU can perform very effectively in an

environment where little or no feedback is available, or transmission delay is too high for retransmission to be effective. The FEC scheme according to the present invention clearly differs from the conventional schemes in that FEC packets can be transmitted over a longer period than a single frame interval without introducing delay in frame playout times. Since RESCU uses FEC packets to restore buffered reference frames (referred to herein as periodic frames), FEC packets can be transmitted over a relatively longer period, interleaving with the packets of other (non-periodic) frames to help reduce the effect of bursty losses.

As stated in Applicant's description of their invention at page 7, lines 7-21, the FXC Coding of the present invention is "**added**" to other channel coding methods that protect against impulse noise. For example, the FXC coding of the present invention can be added to the communication system's interleaving and Reed Solomon (RS) Forward error correction (FEC) coding. Applicant further goes on to state "In contrast, existing RS FEC protects against random bit or byte errors, not erasures, inside a given packet, with the samples taken from nearby points in time." Hence, the bit/byte error correcting Reed Solomon codes disclosed in Rhee (see, e.g., Rhee, col. 1, lines 25-28) are different from, and do not correspond to, the forward erasure correction (FXC) parity superpackets or FXC sync transport packets recited in Claims 1, 9, 12, and 20.

With respect to Claims 2 and 13 (as argued with respect to independent Claims 1 and 12 from which they respectively depend), and contrary to the Examiner's assertion, Rhee fails to disclose or suggest the concept of multiplexing the information superpackets and the FXC parity

super packets "prior to" transmission. In fact, at column 7, lines 10-19, Rhee states the following (emphasis added):

> In combining RESCU with FEC, **the original data** of a periodic frame **is** packetized into k source packets and **transmitted over the frame interval of the periodic frame**. A frame interval refers to the time to transmit all of the data packets of a periodic frame. ***AFTER the frame interval for the periodic frame***, n-k **parity packets for the periodic frame are transmitted** over the PTDD period. The *transmission time* of each parity packet *is evenly spaced* over the period, *interleaving with the packets of other frames*.

From this passage, it is clear that Rhee does not contemplate the idea of multiplexing the information superpackets with the parity superpackets *before or prior* to the actual transmission, and in fact, actually teaches away from the claimed invention. In view of this aspect of the claimed invention, Rhee neither anticipates, nor renders obvious the present invention.

The Examiner has stated the following on page 3 of the pending final Office Action:

> [T]he Rhee reference teaches combining FEC or superpackets with RESCU or FXC super packets. Further, the Rhee reference states RESCU uses FEC packets to restore buffered frames, and the FEC packets then can be transmitted over a relatively large period. Thus, the Rhee reference teaches the concept of multiplexing the information superpackets and the FXC parity super

packets "prior to" transmission (column 2, line 45 - column 3, line 10).

However, **it is respectfully pointed out that none of the words "super" or "superpacket" or "FXC" occur even once in the entire disclosure of Rhee**.

Hence, Rhee does not teach or suggest the above recited limitations of Claims 2 and 13 (as argued with respect to independent Claims 1 and 12 from which they respectively depend). While only Rhee was cited against the above reproduced limitations of Claims 2 and 13 (as argued with respect to independent Claims 1 and 12 from which they respectively depend), it is nonetheless respectively asserted that Schuster does not cure the deficiencies of Rhee and is silent with respect to the above recited limitations.

Accordingly, Claims 2 and 13 are patentably distinct and non-obvious over the cited combination for at least the reasons set forth above. Therefore, withdrawal of the rejection and allowance of Claims 2 and 13 is earnestly requested.

E. Conclusion

At least the above-identified limitations of the pending claims are not disclosed or suggested by the teachings of the cited references. Accordingly, it is respectfully requested that the Board reverse the rejections of Claim 1-3, 5-9, 11-14, and 16-20 under 35 U.S.C. §102(e) and §103(a).

Please charge the amount of $540.00, covering fee associated with the filing of the Appeal Brief, to **Thomson Licensing Inc., Deposit Account No. 07-0832**. In the event of any non-payment or improper payment of a required fee, the Commissioner is authorized to charge **Deposit Account No. 07-0832** as required to correct the error.

Respectfully submitted,

BY: /Jeffrey M. Navon/
Jeffrey M. Navon, Attorney for Applicant
Registration No.: 32,711
Telephone No.: (609) 734-6823

Thomson Licensing LLC
Patent Operations
P.O. Box 5312
Princeton, NJ 08543-5312

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8. CLAIMS APPENDIX

1. (previously presented) An apparatus for enabling recovery of missing information in a digital communication system, comprising:

a Forward Erasure Correction (FXC) encoder for computing FXC parity superpackets across information superpackets for subsequent recovery of any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss; and

a multiplexer for multiplexing the information super packets and the FXC parity superpackes prior to any transmission thereof.

2. (original) The apparatus of claim 1, wherein the FXC encoder computes the FXC parity superpackets across the information superpackets at one byte per each of the information superpackets.

3. (original) The apparatus of claim 1, wherein for k information superpackets, each of length s, said FXC encoder computes h FXC parity superpackets of the length s, where $h = n - k$, n = a block length of each of the FXC parity superpackets, and k = a number of information symbols in each of the FXC parity superpackets.

4. (canceled)

5. (original) The apparatus of claim 1, wherein the multiplexer assigns different Process

IDentifiers (PIDs) to the FXC parity superpackets than the information superpackets.

6. (original) The apparatus of claim 1, wherein the FXC encoder computes the FXC parity superpackets using Reed Solomon (RS) codes.

7. (previously presented) The apparatus of claim 1, wherein the multiplexer generates FXC sync transport packets that indicate a correspondence between superpacket sequence number start positions.

8. (original) The apparatus of claim 1, wherein the FXC parity superpackets are computed over time periods corresponding to an expected length of at least one synchronization loss period.

9. (previously presented) An apparatus for recovering missing information in a digital communication system, comprising:

a Forward Erasure Correction (FXC) decoder for decoding FXC parity superpackets previously computed across information superpackets to recover any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss;

wherein said FXC decoder further decodes FXC sync transport packets to determine superpacket sequence numbers and superpacket positions for both the FXC parity superpackets and the information superpackets.

10. (canceled)

11. (original) The apparatus of claim 9, wherein said FXC decoder is adapted to receive an error signal that indicates an erasure position corresponding to the information superpackets that have been at least partially compromised due to the synchronization loss.

12. (previously presented) A method for enabling recovery of missing information in a digital communication system, comprising:

computing FXC parity superpackets across information superpackets for subsequent recovery of any entire ones of the information superpackets that have been at least partially compromised due to synchronization loss; and

multiplexing the information superpackets and the FXC parity superpackets prior to any transmission thereof.

13. (original) The method of claim 12, wherein said computing step comprises the step of computing the FXC parity superpackets across the information superpackets at one byte per each of the information superpackets.

14. (original) The method of claim 12, wherein for k information superpackets, each of length s, said computing step comprises the step of computing h FXC parity superpackets of the length s, where $h = n - k$, n = a block length of each of the FXC parity superpackets, and k = a number of information symbols in each of the FXC parity superpackets.

15. (canceled)

16. (previously presented) The method of claim 12, wherein said multiplexing step further comprises the step of assigning different Process IDentifiers (PIDs) to the FXC parity superpackets than the information superpackets.

17. (original) The method of claim 12, wherein said computing step computes the FXC parity superpackets using Reed Solomon (RS) codes.

18. (original) The method of claim 12, further comprising the step of generating FXC sync transport packets that indicate a correspondence between superpacket sequence number start positions.

19. (original) The method of claim 12, wherein said computing step computes the FXC parity superpackets over time periods corresponding to an expected length of at least one synchronization loss period.

20. (previously presented) A method for recovering missing information in a digital communication system, comprising:

decoding FXC parity superpackets previously computed across information superpackets to recover any entire ones of the information superpackets that have been at least partially

compromised due to synchronization loss; and

decoding FXC sync transport packets to determine superpacket sequence numbers and superpacket positions for both the FXC parity superpackets and the information superpackets.

21. (canceled)

9. <u>RELATED EVIDENCE APPENDIX</u>

None.

10. RELATED PROCEEDINGS APPENDIX

None